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A Treatise on

Physical Culture

AND

Systematic Exercise,

BY

DAVID ORR EDSON, A. B., M. D.,

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TREATISE ON PHYSICAL CULTURE AND SYSTEMATIC EXERCISE.

It is very gratifying to note that the treatment of certain conditions of disease, especially chronic conditions, by different forms of exercise, should, within so short a time, have become so popular among physicians. Our German friends are to be credited with having first made the attempt to systematize "**movement cures**," but it cannot be said at the present time, that their knowledge in reference to this subject is in any way superior to our own. In Germany the treatment of chronic disease by **passive motion**, and **careful exercise**, is much valued among both **physicians and surgeons of known eminence**, and with people it is extremely popular. Here, in our own country, it is gradually and surely making way, and in due course there can be no doubt that it will create and maintain a position as a curative agent of the very highest value.

Hoffman, A. D. 1660-1742, says in his work "Medicina Rationalis Systematica": "The human body, like all other bodies in nature, possesses material forces, by means of which it affects its movements. All these forces may be reduced to mechanical and mathematical principles. An inponderable but material agent æther, the active moving force, animates all the tissues of the body, and presides over physical phenomena in every domain in creation." He further says: "medicine will never progress until we closely examine the nature of this form of motion, originating in the sentient soul; and until we apply to medicine the laws of mechanics and hydraulics."

In his writings "Dessertationos Physico Medicae," 1708, the sixth division of the first volume, bears the superscription, "Motion the best means of cure for the body." And in the first chapter, "On the attainment of long life," he quotes the saying of Celsus, "The best of all medicine is none." When we consider that Hoffman wrote his celebrated work at the beginning of the last century, we cannot sufficiently admire the illumined mind which shows itself throughout his writings: he says with such clearness, moderation and love of truth,—"He who carefully observes and tests nature's art of healing, is forced to the conclusion that the basis of all health, life and disease, is an exceedingly simple one, which never changes, and is never confused. It is a matter of surprise, therefore, that physicians have invented so many means of cure to preserve health, and to combat disease. Nature maintains life by simple processes; a few contrivances serve her for the preservation of health; nor are the causes of disease many. It is justifiable, therefore, to assume that the remedies to be used in restoring health, should be neither complicated nor numerous. Certainly the medicines by means of which the physician can support the efforts of nature, achieve success, cure the sick, and win honor for himself, are by no means numerous. There are many things which though they appear to have little influence in the healing of disease, or the preservation of health, possess unthought of power. Of this kind are those six matters called natural, namely: air, food, motion, rest, sleeping and waking. The intelligent application of these may be of the greatest service in the art of healing, without medicants. We have an example of their power in the influence of movement and in the exercise of the limbs. The influence of exercise is so strong, if we believe the testimony of the ancients, and of our own experience—that where disease is to be prevented, or cured, it is to be prized more than the most costly medicants."

There are few physicians who study the treatment of disease from the physical or mechanical side, to the extent that we would have them do. Doctor Stone says: "Now at the present time investigation and research are abundantly carried on in the Pathological, Physiological, and Therapeutical aspects of medicine; but the physical or mechanical side is somewhat neglected, for hundreds of ardent questioners of nature, who are laboring with the microscope, in the bilogical and bacterilogical labratories, those who attack medicine from its physical side may be counted upon the fingers of one hand."

Now let us take up the mechanical side of this subject, and see the necessity of properly applied physical exercise. In the first place, the muscles are looked upon as the furnaces the body. and are estimated to contribute four-fifths of the heat necessary to maintain life; the muscles forming about one-half of the substance of the body. Heat is necessary for the nutrition of the body; cold on the other hand, has a markedly depressant action on nutrition. Let us trace the heat developed by the action of a set of muscles, say of the arm.

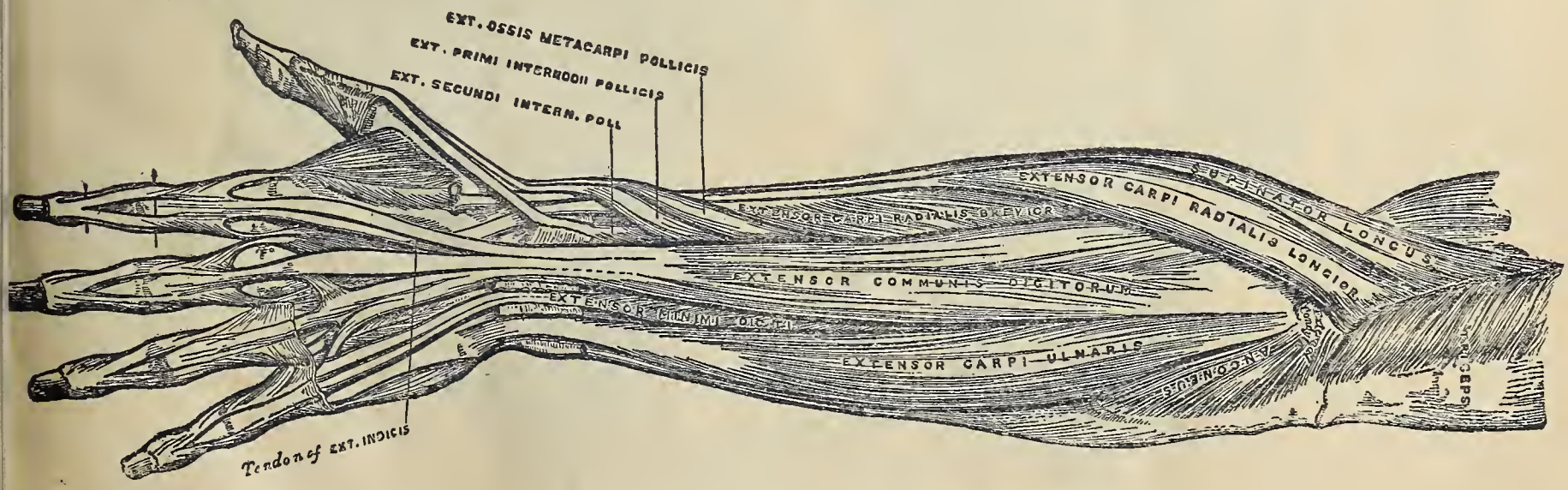


Fig. 1.—Posterior Surface of Forearm, superficial muscles.

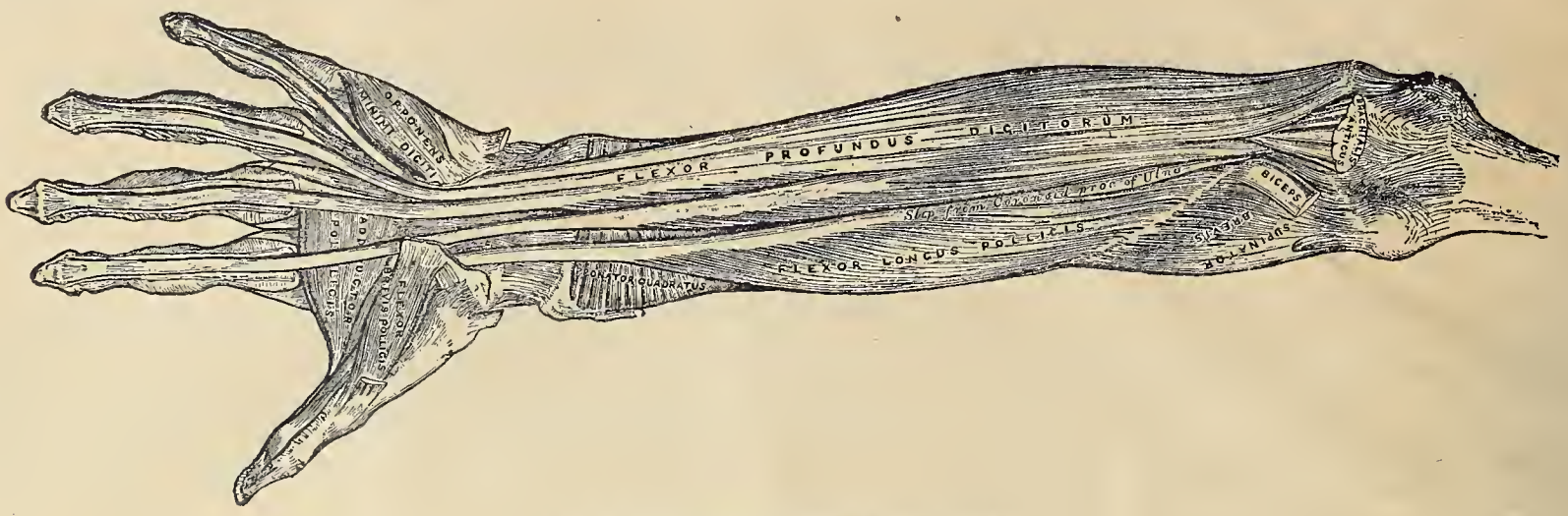


Fig. 2.—Front of the Left Forearm, deep muscles.

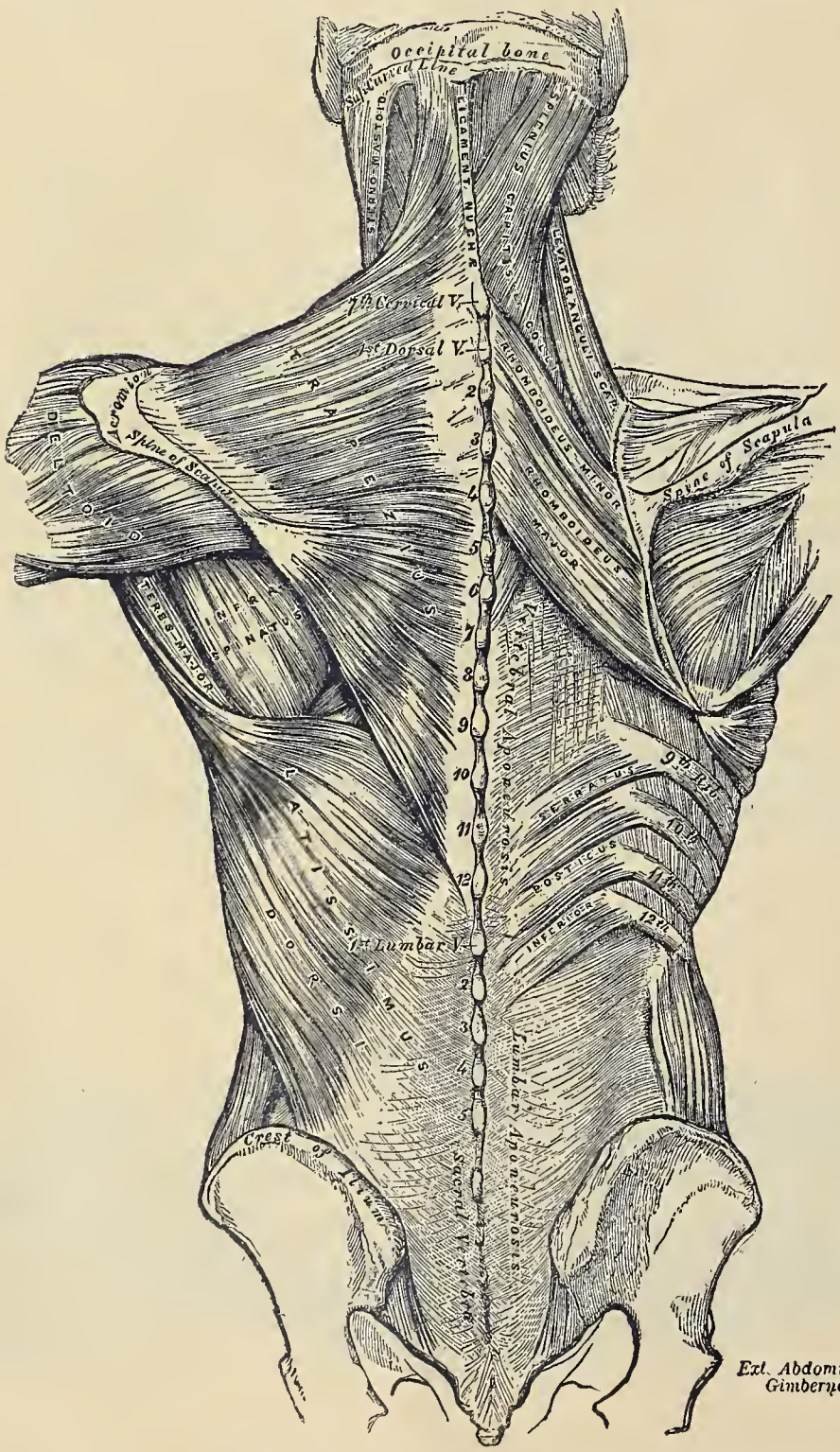


Fig. 3.—The External Oblique Muscle.

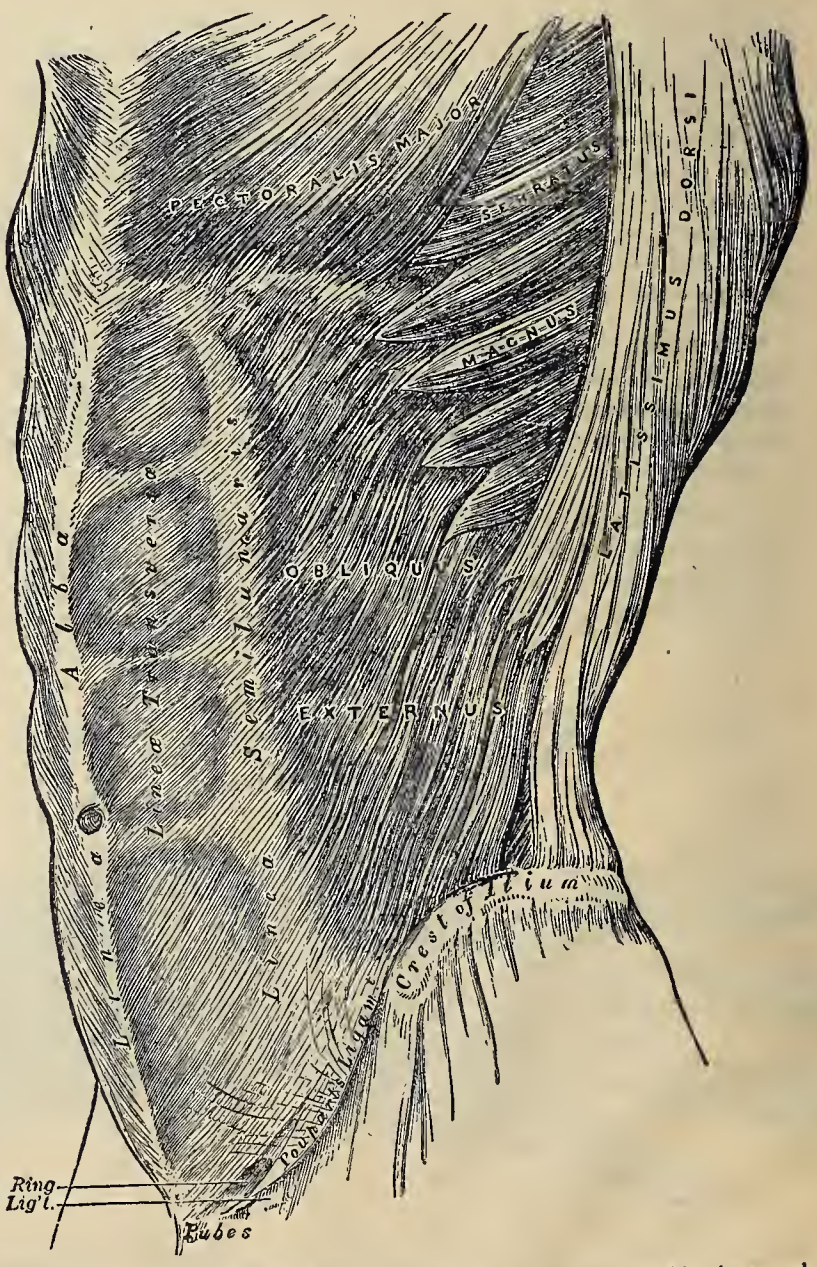


Fig. 4.—Muscles of the Back. On the left side is exposed the first layer; on the right side, the second layer and part of the third.

By the contraction of these muscles heat is developed by the oxidation of the tissues; a demand is made upon the blood for more oxygen. This is to be supplied by the lungs to the little red corpuscles of the blood, which carry it to the tissues in action, there give it up to the muscles and take in exchange the burnt-up material, which is carbonic acid and other effete substances. Therefore we have seen that every organ of the body has been stimulated and put into healthy action by the movement of one set of muscles. The tissues have called upon for more material, the blood, the medium of exchange, has been called upon for an increased supply, the arterioles have opened their flood gates through which to allow this increased amount to pass, by a stimulation of the nervous system which presides over this function—the heart to supply the force, the lungs and digestive track to supply the material, and the kidneys and skin to carry off the effete material. I have said that the muscles formed about one-half of the entire substance of the body. When nature supplied man with the engine to accomplish the work, she also supplied him with a boiler sufficient to supply the amount of force to call into action every portion of the machine, so that one should be a necessary adjunct to the healthy maintenance of the other. Now the question arises, how shall a man confined to office work all day, maintain the healthy equilibrium between muscle and organs? How shall he keep up the tonus of the body? By simply calling into action the different sets of muscles which nature has given him for a set purpose. Take for instance the muscles of the thorax (Chest).

By the *intelligent* exercise of these muscles, we can accomplish in a comparatively short time more than a day laborer, whose muscles are constantly in play.

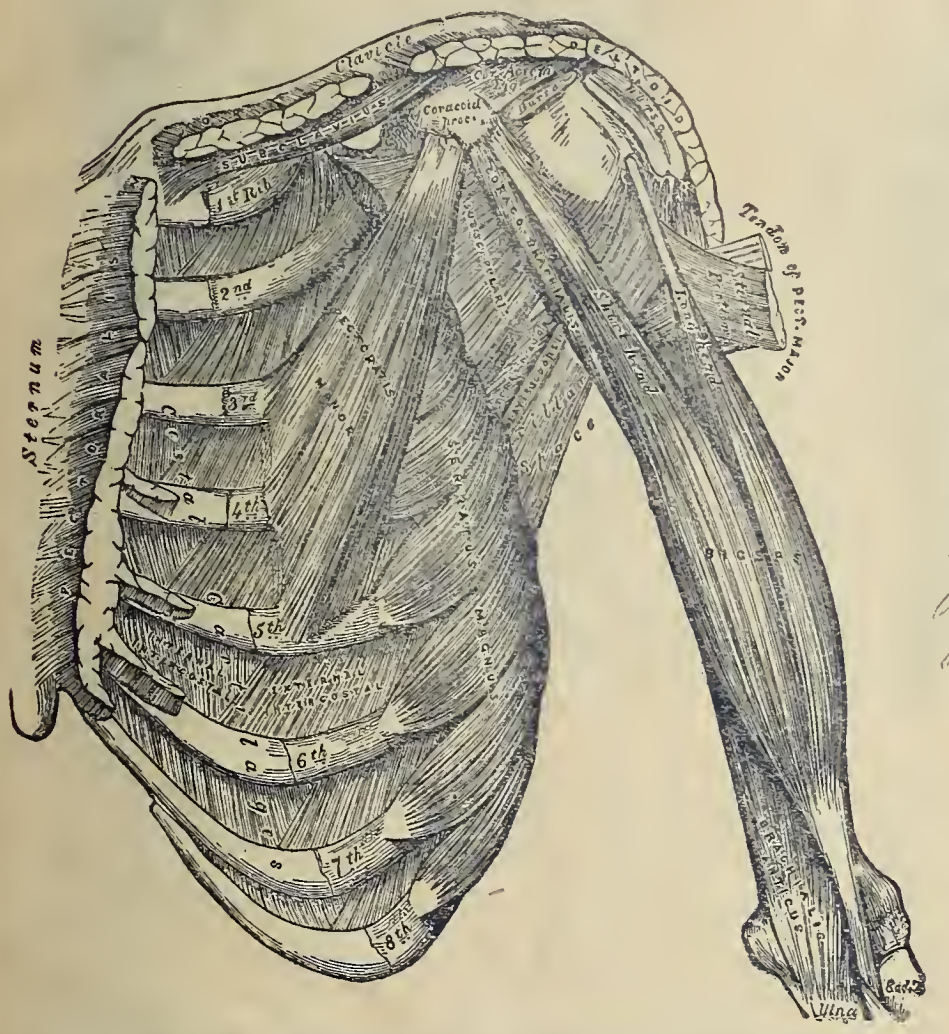


Fig. 5.—Muscles of the Chest and Front ofthe Arm, with the boundaries of the axilla.

Fig. 6.—Muscles of the Chest and Front of the Arm, superficial view.

In the illustration the principal muscles of thorasic (Chest) respiration are to be seen; they are the trapezius, pectoralis major and minor, seratus posticus superior and inferior, and the rhomboidei; also the sterno-mastoid in forced inspiration, by throwing the head back and thus giving a fixed point for the action of the intercostals (those between the ribs).

It will be easily seen, when borne in mind, that a muscle contracts in a line of its fibres; that these muscles when contracted, tend to draw up the ribs, which, by their peculiar shape, give to the chest a larger expansion externally, and therefore a larger capacity internally, for the elastic lung tissue to act; which must be taken advantage of by full inspiration, held a few seconds and then expelled: In this lies the *intelligent* use of these muscles, for by this means we not only develope the muscles but we exercise the lung tissue itself. (Motion shown in figures 5 and 3). This motion alone I have seen work a marvel of benefit upon patients recovering from a pneumonia, where the lungs have been infiltrated with serum (a yellowish fluid), and which I believe would have gone on to consolidation and have been the starting point of "Fibroid Phthisis." (A form of consumption not uncommon as a sequela of pneumonia).

There is still another motion, equally as important, which calls into play the muscles of respiration, and the lung tissue, namely: the diaphragm and muscles of the abdomen. But first let me describe to you the diaphragm: It is a large, leaf-like muscle, which separates the lung cavity above, containing the heart, lungs and their appendages, from the abdominal cavity, containing the liver, stomach, pancreas, spleen, kidneys, bladder and intestines, below. (Digestive organs).

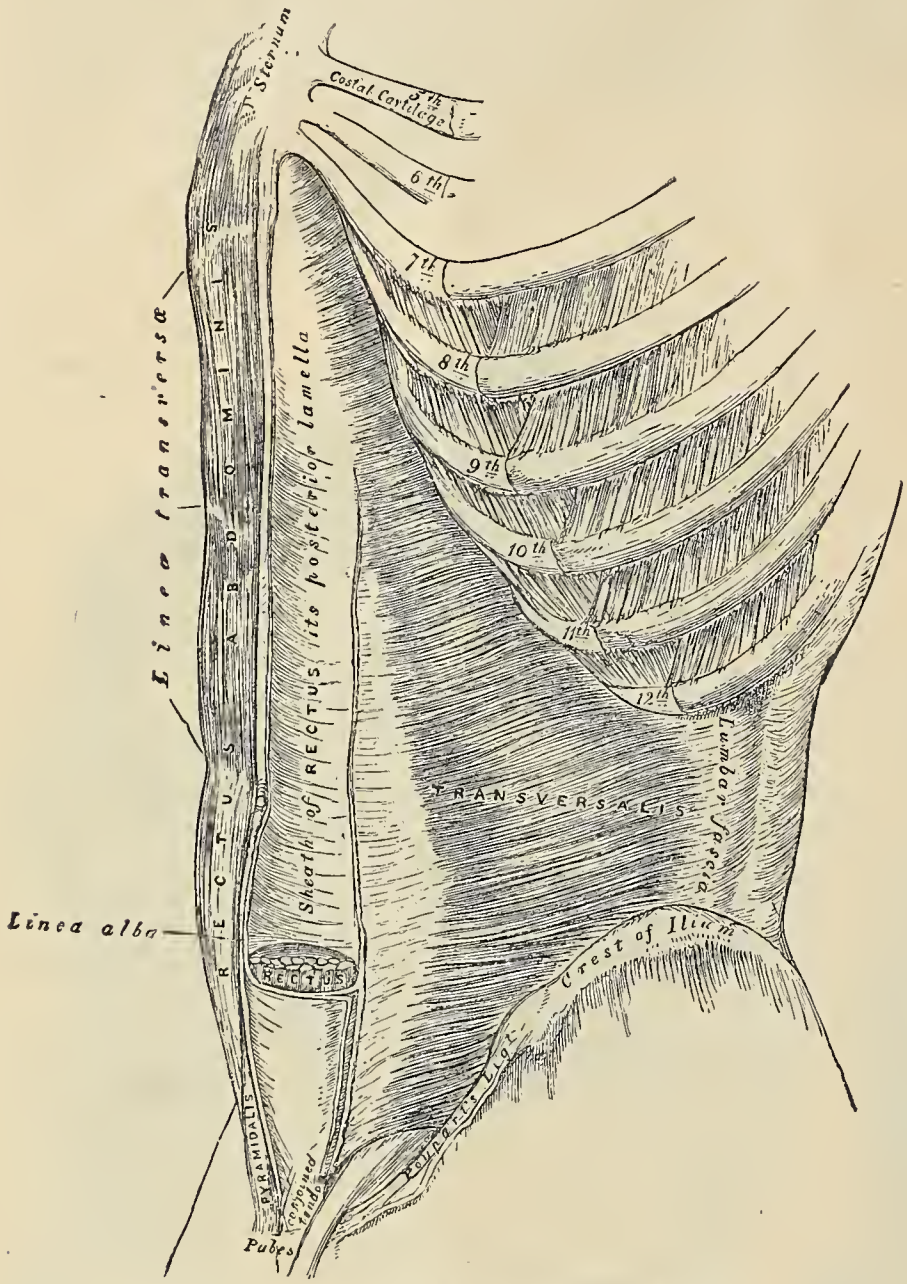


Fig 7.—The Transversalis, Rectus and Pyramidilis Muscles.

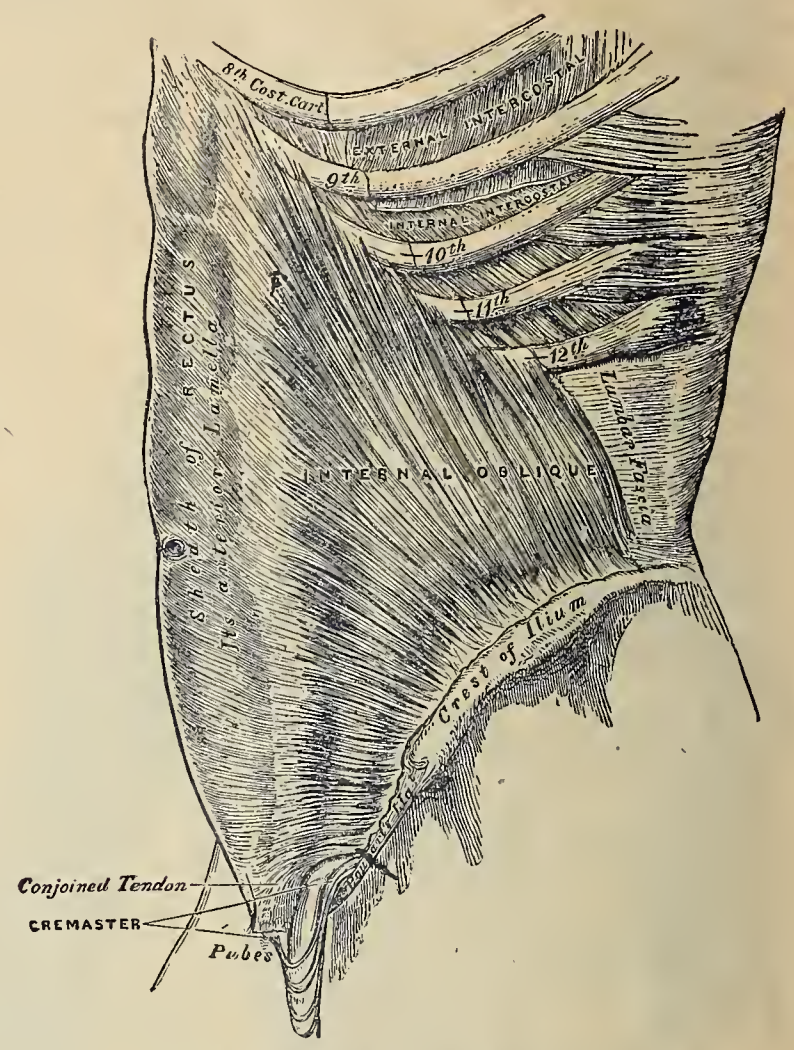
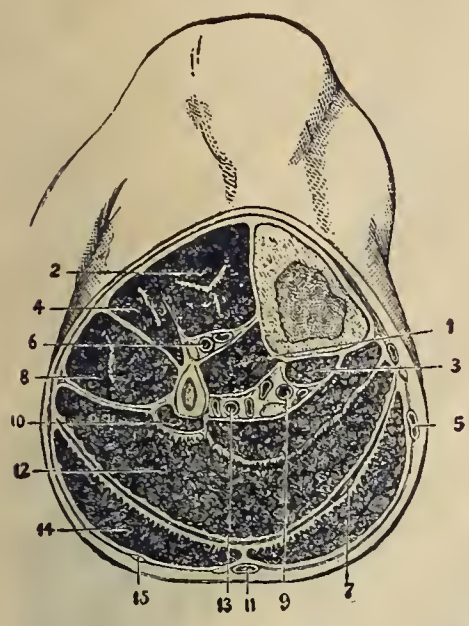


Fig. 8.—The Internal Oblique Muscle.

This muscle when at rest presents a concave, dome-like surface to the abdomen below, and a convex surface to the thorax (Chest above. Its fibres are so arranged that when the muscles contract it flattens, and as a consequence, the floor of the chest is lowered, and therefore the vertical diameter of the chest is increased; while the lower abdominal cavity is encroached upon, and abdominal contents pushed down, so as to cause a projection of the wall of the abdomen itself. By this motion, seen in fig. 24, the muscles and organs called directly into action, are first the abdominal muscles which are the external oblique, directly beneath this the internal oblique, and directly beneath it the transvasalis; while the three minor muscles of the abdomen acted upon, are the rectus, pyramadalis and quadratuslumborum. We have seen how the vertical diameter of the chest has been increased by a full inspiration, and therefore while in the erect position, as seen in fig. 6, the lungs should be well filled, and gradually expired, as the hands and head are lowered. Nor is this all to be accomplished, for when the diaphragm is contracted, as it is by a full inspiration, the liver, stomach and intestines are all displaced, and called into healthy action. I have seen people suffering for years with indigestion and a chain of other symptoms due to a torpid inactive liver, entirely recover by merely this mode of exercise.

I have not the space to go further into development of muscles, I have chosen merely those which are intimately associated with the organs of the body, to show the necessity for the mechanical exercise of the vital organs, which, I am sorry to say, seems to be entirely lost sight of, and in the desire to produce so-called "physical development," I give below a list of the principal muscles of the arms and legs and their actions, for the benefit of those who wish to post themselves on this branch of the anatomy.



A Section of the Right Leg in the Upper Third (Heath, from Beraud): 1, *Tibialis posticus;* 2, *Tibialis anticus:* 3, *Flexo longus digitorum;* 4, *Extensor longus digitorum;* 5, *internal saphenous vein;* 6, *anterior tibial vessels and nerve;* 7, *tendon of Plantaris;* 8 *Peaoneus longus;* 9, *posterior tibial vessels and nerve;* 10, *Flexor longus pollcis;* 11, *external saphenous vein and nerve;* 12, *Soleus with fibrous interseclion;* 13, *peroneal vessels;* 14, *Gastrocnemius (outer half);* 15, *communicans peronei nerve.*

Now let us look at the joints, and their various affections. First you must know that joints, of all structures, are the most frequent seats of pain, either from injury or from atmospheric, gouty or rheumatic influences. In these conditions, more than any others, I believe judicious manipulation and exercise exerts a beneficial effect, both directly on the joint, and indirectly upon the cause of the disease, by stimulating the organs of excreation, *i.e.* the skin, kidneys and lungs, to the elimination of the cause, *i.e.*, the presence of uric acid deposits in and around the joints, should the ailment be gout or rheumatism. I am sorry that I have not the time or space, to go into the physiological reasons why I believe this to be the case, but I am sure that many stiff joints, (not infrequently the result of too conservative treatment) might have been made comparatively free, had a system of judicious exercise and manipulation been carried out at the proper time. It may be well, however, for me to mention a few general indications, and contra-indications, for the use of motion in joint evolvements. To attempt to move a joint during the acute stage of inflamation, would be unwise and improper, for rest and extension are the true requirements for an inflamed joint. But there is a stage after the more acute inflamation has subsided, that a certain amount of motion is absolutely necessary; for at this time the effused material, which is apt to be present after the subsidence of an acutely inflamed joint, if left alone rapidly becomes organized, and a stiff joint is apt to follow; but before exercising and manipulating such a joint, it is well that a skilled surgeon should be consulted. At this stage, however, well directed exercise and manipulation, not only frustrates the organization of this exhuded fluid, but brings about absorption, and healthy restoration of the tissues. Slight elevation of temperature, indicates that extreme caution and care are required; should the increased temperature persist, the joint must be left alone.

The question now presents itself, how shall we exercise a joint? Let us for a moment look at the six principal joints of the body, the shoulder, the elbow, the wrist, the hip, knee and ankle. First, the shoulder. It is a ball and socket joint, and is therefore capable of motion in every direction; forward, backward, elevated, depressed and rotated. These motions are best shown in figs. 5, 7, 12, 20 and 22. The elbow is a hinge joint, and allows of two motions only, flexion and extension. These motions are seen in fig. 8. The wrist, a peculiar and complicated joint, called a condyloid joint, it is capable of all the motions of the shoulder, save rotation. The hip, like the shoulder, is a ball and socket joint, and is therefore capable of motion in every direction. The manipulations are best seen in figs. 26, 27 and 28. The knee and ankle correspond to those of the elbow and wrist, and are exercised by the same correspondence.

Before closing this article I wish to bring before the reader, the marvellous curative power of exercise, on one of perhaps the most common infirmities of the age, *Sleeplessness*—for I think it may be truly defined as an infirmity; it grows unconsciously by habit; it is the precourser of the most serious consequences; it is invariably associated with an irritable, excitable and overtaxed condition of the brain. It denotes a laxity of the cerebral vessels, and a sluggishness of the cerebral circulation. Thomas S. Dowse says: "It is an unnatural and abnormal perversion of one of the grandest of nature's laws." Rest of mind and body, by sleep, is essential to the performance of both mental and physical labor. The chief cause of sleeplessness, is an irritable and overtaxed brain. A brain may be unconsciously as well as consciously overtaxed. There can be little doubt that during sleep, energy accumulates, which is manifested by clearness, brightness, activity of intellect, and a capacity for work which did not previously exist.

There are degrees of sleeplessness. Pure sleep is free from dreams and bodily irritability. Some people apparently sleep all night, but the brain is in a state of fitful wakefulness, and this is perhaps more harmful than no sleep at all. Others again will go to bed, feeling thoroughly tired and exhausted, but in the course of two or three hours will wake, and do what they will, sleep will not return. This is the most common form of sleeplessness. This state of affairs has, perhaps been brought on by over work, anxiety and mental distress. After a time these causes pass away, but still sleeplessness continues; in other words, as somebody has very aptly and truly put it, "Wakefulness begets wakefulness, and sleep begets sleep." For a time such a case as I have described, may remain in good condition. There may be an increased brain power, due to a strong and feverish temperature, but the break-down when it comes, and I think there can be nothing more certain in life, is in many cases, simply disastrous, and partial or total failure of the intellect, and reasoning powers, may be the result.

It is astonishing what slight influences will often bring about sleep. Dr. Carpenter gives the following amusing and instructive story in relation to this. It is said that the Dacots, or professional thieves of India, have been known to steal a mattress from beneath the body of a sleeper, by taking advantage of this tendency:—They begin with intensifying his sleep, by gently fanning his face, and when they judge him to be in a state of profound insensibility, they gently tickle whatever part of his body may lie most conveniently for that purpose. The sleeper withdrawing himself from this irritation towards the edge of the mattress the thief again fans his face for a while, and repeats the tickling, which causes a further movement, and at last the sleeper edges himself off the mattress, with which the thief makes away." I have cited this case merely to show what slight influences often induce deep sleep. Now the question which concerns us is: Have we in exercise an agent, which, as a rule, will so far act upon and suspend mental activity, as to cause sleep? And, if so, in what motions shall this exercise consist? I do not think that any body who has tried the treatment I am about to describe can doubt its calmative and soothing effect; It is often all-sufficient to bring about the desired effect. But in conjunction with this treatment, or any other, it must be born in mind, that the demand nature makes upon us must not be neglected, no matter for what disease. The wrongs perpetrated upon nature, by the brain workers of this age of enlightenment, are chiefly upon the digestive organs, by light and hurried meals during the day, and at night, by relaxation and a heavy indigestible dinner. This should be remedied by taking a good dinner in the middle of the day, and a light, wholesome meal at night, consisting of a chop, or some cold beef or mutton, a piece of toast or slice of bread, one vegetable, and a glass of milk, and no tea or coffee.

Fig. 9.—Muscles of the Front of the Leg.

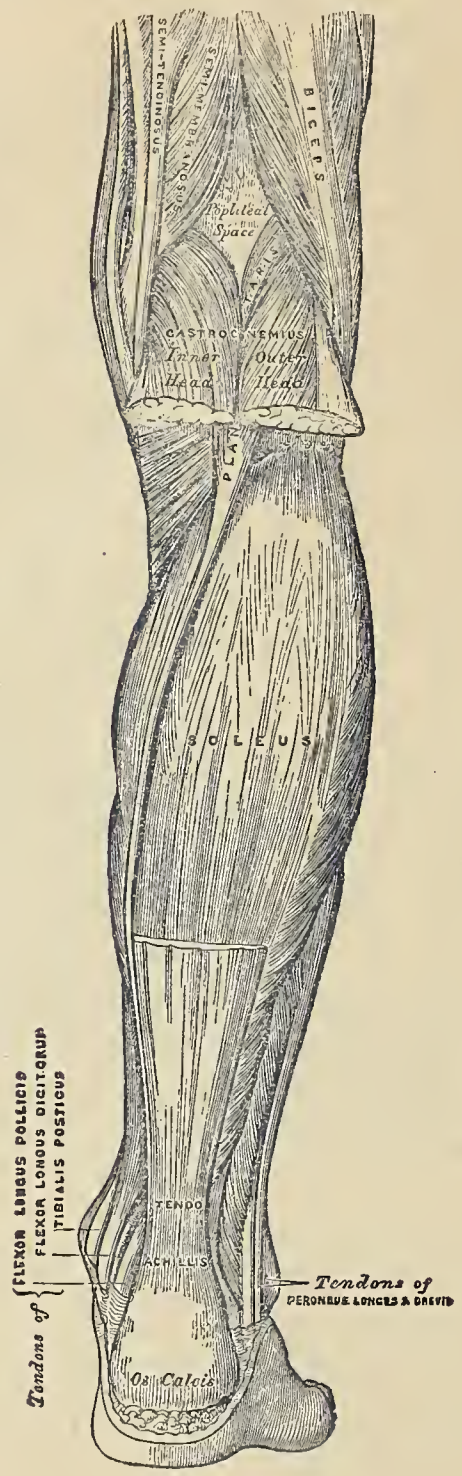


Fig. 11.

Fig. 12.—Deep Muscles of the Internal Femoral Region.

As to the exercise, it should be the motions shown in the illustrations of figs. 2, 4, 5, 6 and 27, and should be persisted in till the operator breaks out in a gentle perspiration. He should then sponge his neck, chests and arms in tepid water, and dry the skin with a rough towel. With this treatment the most obstinate case of sleeplessness will be rewarded to their full satisfaction.

David Jr. Edson M.D.

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